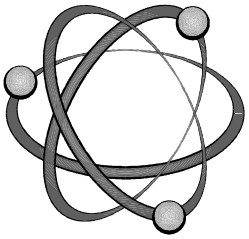
Models of the Atom

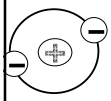


1) Dalton's "Billiard ball" model (1800-1900)

- All matter is made of indivisible atoms.
- Atoms of an element are identical to each other, but different from other elements
- Atoms of different elements combine in constant ratios to form compounds.
- Atoms are not gained or lost in reactions, only rearranged

2) Thompson "Plum pudding" model (1900)

- Negative electrons in a positive framework.

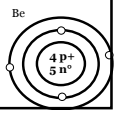


3) The Rutherford model (around 1910)

- Atoms are mostly empty space.
- Negative electrons orbit a positive nucleus.

4) The Bohr model (around 1910)

- e^- orbit the nucleus in shells
- e^- can jump to a higher level if right energy is applied



Atomic numbers, Mass numbers

- **3 subatomic particles**
  - **protons (p^+)**
  - **electrons (e^-)**
  - **neutrons (n^0)**
- **Elements are often symbolized with their mass number and atomic number**

E.g. Oxygen: $^{16}_{8}O$

# of protons = atomic number

# of electrons = protons - charge

# of neutrons = mass number – atomic number

Ion: atom with a charge

- *Due to different # of p^+ & e^-*
- *Can be (+) or (-)*
  - *Metals are (+)*
  - *Nonmetals (-)*
  - *Semimetals (+ or -)*

	Atomic #	Mass #	p^+	n^0	e^-
Ca^{+2}	20	40	20	20	18
Ar	18	40	18	22	18
Br^{-1}	35	80	35	45	36

Isotopes and Radioisotopes

- Atoms of the same element (same # of p^+) that have different numbers of neutrons (n^o) are called isotopes.
- Due to isotopes, atomic masses aren't whole #s
  - Li (6.941g/mol) is made up of both ^{6}Li and ^{7}Li.
- Often, at least one isotope is **unstable**
  - When it breaks down, it releases **radioactivity**.
- These types of isotopes are called radioisotopes